PATENT ABSTRACTS OF JAPAN

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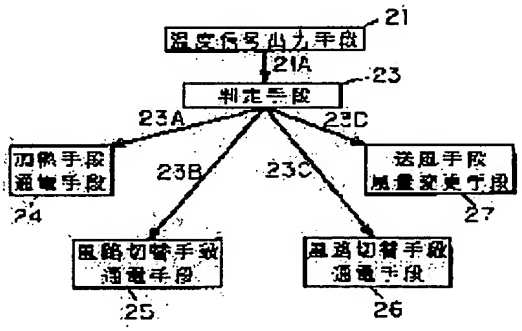
(54) DEHUMIDIFYING/HUMIDIFYING APPARATUS

(57)Abstract:
PURPOSE: To maximize an adsorption value per unit time onto an adsorbent by outputting an energization signal to a heating means energization means corresponding to a temperature signal from a temperature detection means, an energization signal to an air path changing means energizing means and an amount of air signal to a feed air altering means.
CONSTITUTION: A temperature signal output means 21 outputs a temperature signal 21A corresponding to a suction air temperature from a temperature detection means. A judging means 23 receives the temperature signal 21A to output an energization signal to a heating means energization means 24 at a time interval corresponding to the temperature signal 21A, an energization signal 23B for shift to room suction to an air path switching means energization means 25, an energization signal 23C for shift to room exhaustion to an air path switching means energization means 26 and an amount of air altering signal 23D to a blowing means altering means 27. This enables the determining of adsorption time with the highest efficiency from the temperature and moisture of outdoor air thereby maximizing the quantity of adsorption per unit time onto an adsorbent.



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CLAIMS

[Claim(s)]
[Claim 1] The indoor inlet which incorporates indoor air, and the outdoor inlet which incorporates outdoor air, The 1st air course change means which changes said indoor inlet and outdoor inlet, and the indoor exhaust port which discharges outdoor air or indoor air indoors, The 2nd air course change means which changes the outdoor exhaust port which discharges outdoor air or indoor air to outdoor, and said indoor exhaust port and outdoor exhaust port, The ventilation circuit formed from a ventilation means and an adsorption means to have absorptions, such as moisture in air, A heating means to heat this adsorption means near [said] the adsorption means, and a blast weight modification means to make a blast weight change of said ventilation means, The heating means energization means which energizes said heating means, and the 1st air course change means energization means which energizes for said 1st air course change means, The 2nd air course change means energization means which energizes for said 2nd air course change means, The energization signal to said heating means energization means corresponding to the temperature signal which establishes a temperature detection means to detect the temperature of the inhalation air in the upstream from said adsorption means, and is outputted from said temperature detection means, ****** equipment characterized by establishing the 1st control means which outputs the energization signal to said 1st and 2nd air course change means energization means, and the airflow modification signal to said ventilation modification means.
[Claim 2] The indoor inlet which incorporates indoor air, and the outdoor inlet which incorporates outdoor air, The 1st air course change means which changes said indoor inlet and outdoor inlet, and the indoor exhaust port which discharges outdoor air or indoor air indoors, The 2nd air course change means which changes the outdoor exhaust port which discharges outdoor air or indoor air to outdoor, and said indoor exhaust port and outdoor exhaust port, The ventilation circuit formed from a ventilation means and an adsorption means to have absorptions, such as moisture in air, A heating means to heat this adsorption means near [said] the adsorption means, and a blast weight modification means to make a blast weight change of said ventilation means, The heating means energization means which energizes said heating means, and the 1st air course change means energization means which energizes for said 1st air course change means, The 2nd air course change means energization means which energizes for said 2nd air course change means, The energization signal to said heating means energization means corresponding to the humidity signal which establishes a humidity detection means to detect the humidity of the inhalation air in the upstream from said adsorption means, and is outputted from said humidity detection means, ****** equipment characterized by establishing the 2nd control

means which outputs the energization signal to said 1st and 2nd air course change means energization means, and the airflow modification signal to said ventilation modification means.
[Claim 3] The indoor inlet which incorporates indoor air, and the outdoor inlet which incorporates outdoor air, The 1st air course change means which changes said indoor inlet and outdoor inlet, and the indoor exhaust port which discharges outdoor air or indoor air indoors, The 2nd air course change means which changes the outdoor exhaust port which discharges outdoor air or indoor air to outdoor, and said indoor exhaust port and outdoor exhaust port, The ventilation circuit formed from a ventilation means and an adsorption means to have absorptions, such as moisture in air, A heating means to heat this adsorption means near [said] the adsorption means, and a blast weight modification means to make a blast weight change of said ventilation means, The heating means energization means which energizes said heating means, and the 1st air course change means energization means which energizes for said 1st air course change means, The 2nd air course change means energization means which energizes for said 2nd air course change means, A temperature detection means to detect the temperature of inhalation air from said adsorption means upstream, The temperature signal which establishes a humidity detection means to detect the humidity of inhalation air from said adsorption means upstream, and is outputted from said temperature detection means and a humidity detection means, and the energization signal to said heating means energization means corresponding to a humidity signal, ****** equipment characterized by establishing the 3rd control means which outputs the energization signal to said 1st and 2nd air course change means energization means, and the airflow modification signal to said ventilation modification means.
[Claim 4] While establishing a ventilation rate calculation means to correspond to the indoor temperature signal and indoor humidity signal which are outputted from a temperature detection means and a humidity detection means, and to compute an indoor ventilation rate, and a gas exchange calculation means to compute the gas exchange corresponding to said ventilation rate ****** equipment according to claim 3 characterized by establishing the 4th control means which outputs the energization signal to the 1st and 2nd air course change means energization means corresponding to said gas exchange, and the airflow modification signal to a ventilation modification means.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention humidifies the interior of a room which winter dried using the moisture separated from the open air, and a summer is related with ******** which removes moisture from the indoor damp air non-supplied water.
[0002]
[Description of the Prior Art] The conventional ******** non-supplied water has some which are not based on an outdoor air situation but perform fixed time amount and adsorption.

However, there is no control of the adsorption time amount decision according to the temperature and humidity of the open air.
[0003] Moreover, the conventional ******** non-supplied water has the object which ventilates the amount defined like JP,4-278136,A. However, there is nothing that performs control which computes required ventilation volume with adjustable.
[0004]
[Problem(s) to be Solved by the Invention] In ******** which performs fixed time amount adsorption of the above-mentioned conventional technique non-supplied water, even if the temperature and humidity of the open air changed, there was a problem that an adsorbent is not used on critical conditions in order to adsorb on the same conditions, but the object with which original more many amounts of adsorption are obtained was used vainly.
[0005] Moreover, in ******** which ventilates the defined amount non-supplied water, the gas exchange was increased beyond the need and there was a problem of increasing an indoor thermal load.
[0006]
[Means for Solving the Problem] The 1st air course change means which changes the indoor inlet which incorporates indoor air, the outdoor inlet which incorporates outdoor air, said indoor inlet, and an outdoor inlet in order that this invention may solve the above-mentioned technical problem, The 2nd air course change means which changes the outdoor exhaust port which discharges to outdoor air or indoor air the indoor exhaust port which discharges outdoor air or indoor air indoors, and outdoor, said indoor exhaust port, and an outdoor exhaust port, The ventilation circuit formed from a ventilation means and an adsorption means to have absorptions, such as moisture in air, A heating means to heat an adsorption means near [said] the adsorption means, and a blast weight modification means to make a blast weight change of said ventilation means, The heating means energization means which energizes said heating means, and the 1st air course change means energization means which energizes for the 1st aforementioned air course change means, The 2nd air course change means energization means which energizes for the 2nd aforementioned air course change means, The energization signal to said heating means energization means corresponding to the temperature signal which establishes a temperature detection means to detect the temperature of the inhalation air in the upstream from said adsorption means, and is outputted from said temperature detection means, The 1st control means which outputs the energization signal to said 1st and 2nd air course change means energization means and the airflow modification signal to said ventilation modification means is established.
[0007] Moreover, 1st air course change means by which this invention changes the indoor inlet which incorporates indoor air, the outdoor inlet which incorporates outdoor air, said indoor inlet, and an outdoor inlet, The 2nd air course change means which changes the outdoor exhaust port which discharges to outdoor air or indoor air the indoor exhaust port which discharges outdoor air or indoor air indoors, and outdoor, said indoor exhaust port, and an outdoor exhaust port, The ventilation circuit formed from a ventilation means and an adsorption means to have absorptions, such as moisture in air, A heating means to heat an adsorption means near [said] the adsorption means, and a blast weight modification means to make a blast weight change of said ventilation means, The heating means energization means which energizes said heating means, and the 1st air course change means energization means which energizes for the 1st aforementioned air course change means, The 2nd air course change means energization means which energizes for the 2nd aforementioned air course change means, The energization signal to said heating means energization means corresponding to the humidity signal which establishes a humidity detection means to detect the humidity of the inhalation air in the upstream from said adsorption means, and is outputted from said humidity detection means, The 2nd control means which outputs the energization signal to said 1st and 2nd air course change means energization means and the airflow modification signal to said ventilation modification means is established.
[0008] Moreover, 1st air course change means by which this invention changes the indoor inlet which incorporates indoor air, the outdoor inlet which incorporates outdoor air, said indoor inlet, and an outdoor inlet, The 2nd air course change means which changes the outdoor exhaust port

which discharges to outdoor air or indoor air the indoor exhaust port which discharges outdoor air or indoor air indoors, and outdoor, said indoor exhaust port, and an outdoor exhaust port, The ventilation circuit formed from a ventilation means and an adsorption means to have absorptions, such as moisture in air, A heating means to heat an adsorption means near [said] the adsorption means, and a temperature detection means to detect the temperature of inhalation air from said adsorption means upstream, The temperature signal which establishes a humidity detection means to detect the humidity of inhalation air from said adsorption means upstream, and is outputted from said temperature detection means and a humidity detection means, and the energization signal to said heating means corresponding to a humidity signal, The 3rd control means which outputs the energization signal to said 1st and 2nd air course change means and the airflow modification signal to said ventilation means is established.

[0009] Moreover, while establishing a ventilation rate calculation means for this invention to correspond to the indoor temperature signal and indoor humidity signal which are outputted from a temperature detection means and a humidity detection means, and to compute an indoor ventilation rate, and a gas exchange calculation means to compute the gas exchange corresponding to said ventilation rate The 4th control means which outputs the energization signal to said 1st and 2nd air course change means energization means corresponding to said gas exchange and the airflow modification signal to said ventilation modification means is established.

[0010]

[Function] The operation of this invention which established the above-mentioned means is as follows.

[0011] The temperature of the outdoor air inhaled from the outdoor inlet with the ventilation means at the time of adsorption can be detected, and the capacity of an adsorption means can be used effectively by operating by moisture absorption time amount which makes max the amount of humidification of ******** in the temperature non-supplied water.

[0012] Moreover, this invention can detect the humidity of the outdoor air inhaled from the outdoor inlet with the ventilation means at the time of adsorption, and can use the capacity of an adsorption means effectively by operating by moisture absorption time amount which makes max the amount of humidification of ******** in the humidity non-supplied water.

[0013] Moreover, this invention can detect the temperature and humidity of outdoor air which were inhaled from the outdoor inlet with the ventilation means at the time of adsorption, and can utilize the capacity of an adsorption means for the maximum by operating by moisture absorption time amount which makes max the amount of humidification of ******** in the temperature and humidity non-supplied water.

[0014] Moreover, this invention can be ventilated, without increasing an indoor thermal load vainly, when only a complement introduces the open air according to the indoor ventilation rate computed from the humidity of the indoor air inhaled from the indoor inlet from a ventilation means at the time of the amount humidified by ******** non-supplied water, the indoor size set up beforehand, and humidification.

[0015]

[Example] Hereafter, a drawing is explained to reference about the example of this invention.

[0016] First, drawing 1 and drawing 2 explain the 1st example of this invention. Drawing 1 shows the configuration of ******** in the example of this invention non-supplied water. drawing 1 -- setting -- 1 -- an outdoor inlet and 2 -- an indoor inlet and 3 -- the 1st air course change means and 4 -- for a ventilation means and 7, as for an indoor exhaust port and 9, the 2nd air course change means and 8 are [a heating means and 5 / an adsorption means and 6 / an outdoor exhaust port and 10] temperature detection means. A zeolite, an alumina, silica gel, etc. can be used as an adsorption means here, and it is not limited especially.

[0017] Drawing 2 is the 1st control means in the example of this invention. A temperature signal output means to output temperature signal 21A corresponding to the temperature of the inhalation air to which 21 is outputted from the temperature detection means 10 in drawing 2 , and 23 are judgment means. In response to temperature signal 21A, it outputs to a heating means energization means 24 to perform energization to the heating means 4 for energization

signal 23A, with the time interval corresponding to temperature signal 21A. Energization signal 23B made into indoor inhalation of air is outputted to an air course change means energization means 25 to perform energization to the air course change means 3. Energization signal 23C considered as indoor exhaust air is outputted to an air course change means energization means 26 to perform energization to the air course change means 7, and airflow modification signal 23D is outputted to a ventilation means airflow modification means 27 to perform energization to the ventilation means 7.

[0018] Although moisture is adsorbed with the adsorption means 5 and the outdoor air inhaled from the outdoor inlet is discharged from an outdoor exhaust port by the ventilation means while ******** non-supplied water is adsorbing moisture from outdoor air Long time amount is needed for adsorption being promoted and being able to obtain the amount of adsorption required of short time amount, if the temperature of outdoor air is low as it is shown in drawing 3 , since an adsorption reaction is exothermic reaction, adsorption becoming slow if the temperature of outdoor air is low, and obtaining the required amount of adsorption at this time. Moreover, a rate of adsorption decreases as are shown in drawing 4 and the surface coverage to an adsorbent rises. Then, when the temperature of outdoor air is low, energization signal 23A, energization signal 23B, energization signal 23C, and airflow change signal 23D are outputted at short spacing, and when temperature is high, energization signal 23A, energization signal 23B, energization signal 23C, and airflow change signal 23D are outputted at long spacing.

[0019] Thus, since the adsorption time amount corresponding to the OAT at the time of adsorption can be selected according to this example, a place with the sufficient moisture absorption effectiveness of an adsorbent can be used for the bottom of various OATs, therefore the capacity of a moisture absorption means can be used efficiently.

[0020] Next, drawing 5 and drawing 6 explain the 2nd example of this invention. Here, the sign same about the same object as a previous example is attached, and explanation is omitted.

[0021] In drawing 5 , 31 is a humidity detection means. Moreover, drawing 6 is the 2nd control means. A humidity signal output means to output humidity signal 41A corresponding to the humidity of the inhalation air by which 41 is detected with the humidity detection means 31 in drawing 6 , and 42 are judgment means. In response to humidity signal 41A, with the time interval corresponding to humidity signal 41A, energization signal 42A Output to a heating means energization means 24 to perform energization to the heating means 4, and energization signal 42B made into indoor inhalation of air is outputted to an air course change means energization means 25 to perform energization to the air course change means 3. Energization signal 42C considered as indoor exhaust air is outputted to an air course change means energization means 26 to perform energization to the air course change means 7, and airflow modification signal 42D is outputted to a ventilation means airflow modification means 27 to perform energization to the ventilation means 7.

[0022] Although moisture is adsorbed with the adsorption means 5 and the outdoor air inhaled from the outdoor inlet is discharged from an outdoor exhaust port by the ventilation means while ******** non-supplied water is adsorbing moisture from outdoor air Since adsorption is influenced by the partial pressure of the steam in air and it will spend for time amount to adsorption at this time if its humidity of outdoor air is low as shown in drawing 7 Long time amount is needed for obtaining the required amount of adsorption, and if the humidity of outdoor air is low, adsorption becomes quick and can obtain the required amount of adsorption by short time amount. Moreover, a rate of adsorption decreases as are shown in drawing 4 and the surface coverage to an adsorbent rises. Then, when the humidity of outdoor air is low, energization signal 23A, energization signal 23B, energization signal 23C, and airflow change signal 23D are outputted at long spacing, and when humid, energization signal 23A, energization signal 23B, energization signal 23C, and airflow change signal 23D are outputted at short spacing.

[0023] Thus, since the adsorption time amount corresponding to the open air humidity at the time of adsorption can be selected according to this example, a place with the sufficient moisture absorption effectiveness of an adsorbent can be used for the bottom of various open air humidity, therefore the capacity of a moisture absorption means can be used efficiently.

[0024] Next, drawing 8 and drawing 9 explain the 3rd example of this invention. Here, the sign same about the same object as a previous example is attached, and explanation is omitted.
[0025] Moreover, drawing 9 is the 3rd control means. In drawing 9 , 51 is a judgment means, and in response to temperature signal 10A and humidity signal 41A with the time interval corresponding to temperature signal 10A and temperature signal 41A energization signal 51A Output to a heating means energization means 24 to perform energization to the heating means 4, and energization signal 51B made into indoor inhalation of air is outputted to an air course change means energization means 25 to perform energization to the air course change means 3. Energization signal 51C considered as indoor exhaust air is outputted to an air course change means energization means 26 to perform energization to the air course change means 7, and airflow modification signal 51D is outputted to a ventilation means airflow modification means 27 to perform energization to the ventilation means 7.
[0026] Although moisture is adsorbed with the adsorption means 5 and the outdoor air inhaled from the outdoor inlet is discharged from an outdoor exhaust port by the ventilation means while ******** non-supplied water is adsorbing moisture from outdoor air Since an adsorption reaction is exothermic reaction at this time and it is influenced by the partial pressure of the steam in air again, as shown in drawing 10 , since the amount of adsorption influences as a mutually-independent factor, the temperature and humidity of outdoor air The temperature of outdoor air is low, when humid, adsorption is promoted and can obtain the amount of adsorption required of short time amount, and when [when the temperature of outdoor air is low] humidity is low, long time amount is needed for adsorption becoming slow and obtaining the required amount of adsorption. Moreover, a rate of adsorption decreases as are shown in drawing 4 and the surface coverage to an adsorbent rises. Then, it hits the unit time obtained from the temperature and humidity of outdoor air, and a time interval with the largest amount of adsorption is outputted to energization signal 23A, energization signal 23B, energization signal 23C, and airflow change signal 23D.
[0027] Thus, since the adsorption time amount corresponding to the temperature and humidity of the open air at the time of adsorption can be selected according to this example, a place with the sufficient moisture absorption effectiveness of an adsorbent can be used for the bottom of various open air conditions, therefore it can make the most of the capacity of a moisture absorption means.
[0028] Next, drawing 11 and drawing 12 explain the 4th example of this invention. Here, the sign same about the same object as a previous example is attached, and explanation is omitted.
Drawing 12 is the 4th control means. In drawing 12 , 61 is a ventilation rate calculation means and outputs ventilation rate signal 61A in response to humidity signal 41A outputted from the temperature signal 21A humidity signal output means outputted from a temperature signal output means. 62 takes a difference with a regular gas exchange in response to ventilation rate signal 61A outputted from a ventilation rate calculation means with a gas exchange calculation means, and outputs gas exchange signal 62A. Energization signal 63A which 63 is a judgment means and is made into outdoor inhalation of air with the time interval corresponding to gas exchange signal 62A in response to gas exchange signal 62A is outputted to an air course change means energization means 25 to perform energization to the air course change means 3. an air course change means energization means 26 to perform energization to the air course change means 7 for energization signal 63B considered as indoor exhaust air -- ** -- it outputs so that it may become, and airflow modification signal 63C is outputted to a ventilation means airflow modification means 27 to perform energization to the ventilation means 7.
[0029] Thus, since a gas exchange can be determined without disregarding the amount of natural ventilation of the room according to this example, ventilation is possible, without increasing an indoor thermal load vainly, since it is not necessary to perform unnecessary ventilation.
[0030]
[Effect of the Invention] The 1st air course change means which as for this invention changes the indoor inlet which incorporates indoor air, the outdoor inlet which incorporates outdoor air, said indoor inlet, and an outdoor inlet so that clearly from explanation of the above-mentioned example, The 2nd air course change means which changes the outdoor exhaust port which

discharges to outdoor air or indoor air the indoor exhaust port which discharges outdoor air or indoor air indoors, and outdoor, said indoor exhaust port, and an outdoor exhaust port, The ventilation circuit formed from a ventilation means and an adsorption means to have absorptions, such as moisture in air, A heating means to heat an adsorption means near [said] the adsorption means, and a blast weight modification means to make a blast weight change of said ventilation means, The heating means energization means which energizes said heating means, and the 1st air course change means energization means which energizes for the 1st aforementioned air course change means, In ******** which offered the 2nd air course change means energization means which energizes for the 2nd aforementioned air course change means non-supplied water By having established a temperature detection means to detect the temperature of the inhalation air in the upstream from said adsorption means, at the time of moisture absorption of ******** non-supplied water By detecting the temperature of outdoor air and making it adsorb with the time interval to which the amount of adsorption becomes the largest per [under these conditions] unit time amount, the capacity of an adsorbent can be used efficiently and more amounts of humidification can be obtained.

[0031] Moreover, by having established a humidity detection means to detect the humidity of the inhalation air in the upstream from said adsorption means, by detecting the humidity of outdoor air at the time of moisture absorption of ******** non-supplied water, and making it adsorb with the time interval to which the amount of adsorption becomes the largest per [under these conditions] unit time amount, this invention can use the capacity of an adsorbent efficiently and can obtain more amounts of humidification.

[0032] Moreover, by having established a humidity detection means to detect the humidity of the inhalation air in the upstream from said adsorption means, and a humidity detection means to detect humidity, this invention By detecting the temperature and humidity of outdoor air at the time of moisture absorption of ******** non-supplied water, and making it adsorb with the time interval to which the amount of adsorption becomes the largest per [under these conditions] unit time amount, the capacity of an adsorbent can be used efficiently and the maximum amount of humidification in the adsorbent can be obtained.

[0033] About the above, inhalation air at the time of moisture absorption can be made into indoor air, and effectiveness with the same said of indoor dehumidification can be acquired by discharging from an outdoor exhaust port.

[0034] Moreover, this invention computes a ventilation rate from change of the indoor temperature and humidity to the amount of humidification of ********, a gas exchange is computed further, and by performing ventilation corresponding to a gas exchange, even if indoor converted quantity changes, it does not need to perform useless ventilation, and it can exclude the futility of energy.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The block diagram of ******** in the 1st example of this invention non-supplied water
[Drawing 2] The conceptual diagram of the relation of the OAT and the output time interval of each signal in the 1st example of this invention
[Drawing 3] The property Fig. of the amount of moisture absorption by the temperature of a desiccant
[Drawing 4] The property Fig. of the rate of adsorption by the surface coverage of a desiccant
[Drawing 5] The block diagram of the humidifier in the 2nd example of this invention non-supplied water
[Drawing 6] The conceptual diagram of the relation of the open air humidity and the output time interval of each signal in the 2nd example of this invention
[Drawing 7] The property Fig. of the amount of moisture absorption by the humidity of a desiccant
[Drawing 8] The block diagram of the humidifier in the 3rd example of this invention non-supplied water
[Drawing 9] The conceptual diagram of relation with the output time interval of each signal over the 3rd open air humidity and humidity in an example of this invention
[Drawing 10] The property Fig. of the amount of moisture absorption by the temperature and humidity of a desiccant
[Drawing 11] The block diagram of the humidifier in the 4th example of this invention non-supplied water
[Drawing 12] The conceptual diagram of relation with the output time interval of each signal over the indoor humidity in the 4th example of this invention
[Description of Notations]
1 Outdoor Inlet
2 Indoor Inlet
3 Air Course Change Means
4 Heating Means
5 Adsorption Means
6 Ventilation Means
7 Air Course Change Means
8 Indoor Exhaust Port
9 Outdoor Exhaust Port
10 Temperature Detection Means
21 Temperature Signal Output Means
23 Judgment Means
23A Energization signal
23B Energization signal
23C Energization signal
23D Airflow change signal
24 Heating Means Energization Means
25 Air Course Change Means Energization Means
26 Air Course Change Means Energization Means
27 Ventilation Means Airflow Change Means
31 Humidity Detection Means
41 Humidity Signal Output Means
42 Judgment Means
42A Energization signal
42B Energization signal
42C Energization signal
42D Airflow change signal
51 Judgment Means
51A Energization signal
51B Energization signal

51C Energization signal
51D Airflow change signal
61 Ventilation Rate Calculation Means
61A Ventilation rate signal
62 Gas Exchange Calculation Means
62A Gas exchange signal
63 Judgment Means
63A Energization signal
63B Energization signal
63C Airflow change signal

[Translation done.]

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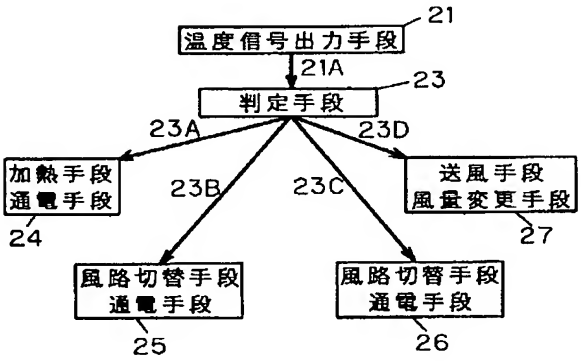
(54)【発明の名称】　除加湿装置

(57)【要約】

【目的】　室外空気の温度や湿度より最も吸着効率の良い吸着時間を決定し、単位時間当たりの吸着量を最大にすることを目的とするものである。

【構成】　第１の風路切替手段と、第２の風路切替手段と、送風手段と吸着手段よりなる通風回路と、吸着手段を加熱する加熱手段と、前記送風手段への送風量変更手段２７と、加熱手段への通電手段２４と、第１の風路切替手段に通電を行う第１の風路切替手段通電手段２５と、第２の風路切替手段に通電を行う第２の風路切替手段通電手段２６と、前記吸着手段より上流で吸入空気の温度を検出する温度検出手段を設け、前記温度検出手段より出力される温度信号に対応する加熱手段通電手段２１への通電信号２１Ａと、第１の風路切替手段通電手段への室内吸気とする通電信号２１Ｂ、第２の風路切替手段通電手段への室内排気とする通電信号２１Ｃと、前記送風変更手段への風量変更信号２１Ｄを出力する制御手段を設ける。



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【特許請求の範囲】

【請求項１】　室内の空気を取り込む室内吸気口と、室外の空気を取り込む室外吸気口と、前記室内吸気口と室外吸気口を切り替える第１の風路切替手段と、室外の空気または室内の空気を室内に排出する室内排気口と、室外の空気または室内の空気を室外に排出する室外排気口と、前記室内排気口と室外排気口を切り替える第２の風路切替手段と、送風手段と空気中の水分などの吸着作用を有する吸着手段より形成される通風回路と、前記吸着手段近傍にこの吸着手段を加熱する加熱手段と、前記送風手段の送風量変更を行う送風量変更手段と、前記加熱手段の通電を行う加熱手段通電手段と、前記第１の風路切替手段に通電を行う第１の風路切替手段通電手段と、前記第２の風路切替手段に通電を行う第２の風路切替手段通電手段と、前記吸着手段より上流での吸入空気の温度を検出する温度検出手段を設け、前記温度検出手段より出力される温度信号に対応する前記加熱手段通電手段への通電信号と、前記第１及び第２の風路切替手段通電手段への通電信号と、前記送風変更手段への風量変更信号を出力する第１の制御手段を設けたことを特徴とする除加湿装置。

【請求項２】　室内の空気を取り込む室内吸気口と、室外の空気を取り込む室外吸気口と、前記室内吸気口と室外吸気口を切り替える第１の風路切替手段と、室外の空気または室内の空気を室内に排出する室内排気口と、室外の空気または室内の空気を室外に排出する室外排気口と、前記室内排気口と室外排気口を切り替える第２の風路切替手段と、送風手段と空気中の水分などの吸着作用を有する吸着手段より形成される通風回路と、前記吸着手段近傍にこの吸着手段を加熱する加熱手段と、前記送風手段の送風量変更を行う送風量変更手段と、前記加熱手段の通電を行う加熱手段通電手段と、前記第１の風路切替手段に通電を行う第１の風路切替手段通電手段と、前記第２の風路切替手段に通電を行う第２の風路切替手段通電手段と、前記吸着手段より上流での吸入空気の湿度を検出する湿度検出手段を設け、前記湿度検出手段より出力される湿度信号に対応する前記加熱手段通電手段への通電信号と、前記第１及び第２の風路切替手段通電手段への通電信号と、前記送風変更手段への風量変更信号を出力する第２の制御手段を設けたことを特徴とする除加湿装置。

【請求項３】　室内の空気を取り込む室内吸気口と、室外の空気を取り込む室外吸気口と、前記室内吸気口と室外吸気口を切り替える第１の風路切替手段と、室外の空気または室内の空気を室内に排出する室内排気口と、室外の空気または室内の空気を室外に排出する室外排気口と、前記室内排気口と室外排気口を切り替える第２の風路切替手段と、送風手段と空気中の水分などの吸着作用を有する吸着手段より形成される通風回路と、前記吸着手段近傍にこの吸着手段を加熱する加熱手段と、前記送

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風手段の送風量変更を行う送風量変更手段と、前記加熱手段の通電を行う加熱手段通電手段と、前記第１の風路切替手段に通電を行う第１の風路切替手段通電手段と、前記第２の風路切替手段に通電を行う第２の風路切替手段通電手段と、前記吸着手段より上流で吸入空気の温度を検出する温度検出手段と、前記吸着手段より上流で吸入空気の湿度を検出する湿度検出手段を設け、前記温度検出手段及び湿度検出手段より出力される温度信号と湿度信号に対応する前記加熱手段通電手段への通電信号と、前記第１及び第２の風路切替手段通電手段への通電信号と、前記送風変更手段への風量変更信号を出力する第３の制御手段を設けたことを特徴とする除加湿装置。

【請求項４】　温度検出手段と湿度検出手段より出力される室内の温度信号と湿度信号に対応し室内の換気回数を算出する換気回数算出手段と、前記換気回数に対応した換気量を算出する換気量算出手段を設けると共に、前記換気量に対応した第１及び第２の風路切替手段通電手段への通電信号と、送風変更手段への風量変更信号を出力する第４の制御手段を設けたことを特徴とする請求項３記載の除加湿装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、冬季の乾燥した室内を外気より分離した水分を用いて加湿し、また夏期は室内の湿った空気より湿気を取り除く無給水除加湿器に関するものである。

【０００２】

【従来の技術】従来の無給水除加湿器は室外の空気状況によらず一定の時間、吸着を行うものがある。しかし、外気の温湿度に応じた吸着時間決定の制御はない。

【０００３】また、従来の無給水除加湿器は例えば特開平４－２７８１３６号のように定められた量の換気を行う物がある。しかし、必要換気量を可変で算出する制御を行うものはない。

【０００４】

【発明が解決しようとする課題】上記従来技術の一定時間吸着を行う無給水除加湿器では外気の温度や湿度が変化しても、同じ条件で吸着を行うため吸着剤がクリティカルな条件で使用されず、本来、より多くの吸着量が得られる物が無駄に使用されているという問題があった。

【０００５】また、定められた量の換気を行う無給水除加湿器では必要以上に換気量を増やしてしまい室内の熱負荷を増大させてしまうという問題があった。

【０００６】

【問題を解決するための手段】本発明は上記課題を解決するため、室内の空気を取り込む室内吸気口と室外の空気を取り込む室外吸気口と前記室内吸気口と室外吸気口を切り替える第１の風路切替手段と、室外の空気または室内の空気を室内に排出する室内排気口と室外の空気または室内の空気を室外に排出する室外排気口と前記室内

排気口と室外排気口を切り替える第２の風路切替手段と、送風手段と空気中の水分などの吸着作用を有する吸着手段より形成される通風回路と、前記吸着手段近傍に吸着手段を加熱する加熱手段と、前記送風手段の送風量変更を行う送風量変更手段と、前記加熱手段の通電を行う加熱手段通電手段と、前記の第１の風路切替手段に通電を行う第１の風路切替手段通電手段と、前記の第２の風路切替手段に通電を行う第２の風路切替手段通電手段と、前記吸着手段より上流での吸入空気の温度を検出する温度検出手段を設け、前記温度検出手段より出力される温度信号に対応する前記加熱手段通電手段への通電信号と、前記第１及び第２の風路切替手段通電手段への通電信号と、前記送風変更手段への風量変更信号を出力する第１の制御手段を設けたものである。

【０００７】また本発明は、室内の空気を取り込む室内吸気口と室外の空気を取り込む室外吸気口と前記室内吸気口と室外吸気口を切り替える第１の風路切替手段と、室外の空気または室内の空気を室内に排出する室内排気口と室外の空気または室内の空気を室外に排出する室外排気口と前記室内排気口と室外排気口を切り替える第２の風路切替手段と、送風手段と空気中の水分などの吸着作用を有する吸着手段より形成される通風回路と、前記吸着手段近傍に吸着手段を加熱する加熱手段と、前記送風手段の送風量変更を行う送風量変更手段と、前記加熱手段の通電を行う加熱手段通電手段と、前記の第１の風路切替手段に通電を行う第１の風路切替手段通電手段と、前記の第２の風路切替手段に通電を行う第２の風路切替手段通電手段と、前記吸着手段より上流での吸入空気の湿度を検出する湿度検出手段を設け、前記湿度検出手段より出力される湿度信号に対応する前記加熱手段通電手段への通電信号と、前記第１及び第２の風路切替手段通電手段への通電信号と、前記送風変更手段への風量変更信号を出力する第２の制御手段を設けたものである。

【０００８】また本発明は、室内の空気を取り込む室内吸気口と室外の空気を取り込む室外吸気口と前記室内吸気口と室外吸気口を切り替える第１の風路切替手段と、室外の空気または室内の空気を室内に排出する室内排気口と室外の空気または室内の空気を室外に排出する室外排気口と前記室内排気口と室外排気口を切り替える第２の風路切替手段と、送風手段と空気中の水分などの吸着作用を有する吸着手段より形成される通風回路と、前記吸着手段近傍に吸着手段を加熱する加熱手段と、前記吸着手段より上流で吸入空気の温度を検出する温度検出手段と、前記吸着手段より上流で吸入空気の湿度を検出する湿度検出手段を設け、前記温度検出手段及び湿度検出手段より出力される温度信号と湿度信号に対応する前記加熱手段への通電信号と、前記第１及び第２の風路切替手段への通電信号と、前記送風手段への風量変更信号を出力する第３の制御手段を設けたものである。

【０００９】また本発明は、温度検出手段と湿度検出手段より出力される室内の温度信号と湿度信号に対応し室内の換気回数を算出する換気回数算出手段と、前記換気回数に対応した換気量を算出する換気量算出手段を設けると共に、前記換気量に対応した前記第１及び第２の風路切替手段通電手段への通電信号と、前記送風変更手段への風量変更信号を出力する第４の制御手段を設けたものである。

【００１０】

【作用】上記手段を設けた本発明の作用は、以下の通りである。

【００１１】吸着時に送風手段により室外吸気口より吸入した室外空気の温度を検出し、その温度での無給水除加湿器の加湿量を最大にするような吸湿時間で運転することにより吸着手段の能力を有効利用することができる。

【００１２】また本発明は吸着時に送風手段により室外吸気口より吸入した室外空気の湿度を検出し、その湿度での無給水除加湿器の加湿量を最大にするような吸湿時間で運転することにより吸着手段の能力を有効に利用することができる。

【００１３】また本発明は吸着時に送風手段により室外吸気口より吸入した室外空気の温度と湿度を検出し、その温湿度での無給水除加湿器の加湿量を最大にするような吸湿時間で運転することにより吸着手段の能力を最大限に活用することができる。

【００１４】また本発明は無給水除加湿器で加湿した量とあらかじめ設定された室内の広さと加湿時に送風手段より室内吸気口より吸入した室内空気の湿度より算出した室内の換気回数に従い、必要な量だけ外気を導入してやることにより、室内の熱負荷を無駄に増大させることなく換気をすることができる。

【００１５】

【実施例】以下、本発明の実施例について、図面を参考に説明する。

【００１６】まず、図１と図２により本発明の第１の実施例について説明する。図１は本発明の実施例における無給水除加湿器の構成を示す。図１において、１は室外吸気口、２は室内吸気口、３は第１の風路切替手段、４は加熱手段、５は吸着手段、６は送風手段、７は第２の風路切替手段、８は室内排気口、９は室外排気口、１０は温度検出手段である。ここで吸着手段としてはゼオライトやアルミナやシリカゲル等が使用でき、特に限定されない。

【００１７】図２は本発明の実施例における第１の制御手段である。図２において、２１は温度検出手段１０より出力される吸入空気の温度に対応した温度信号２１Ａを出力する温度信号出力手段、２３は判定手段で、温度信号２１Ａを受けて温度信号２１Ａに対応した時間間隔で通電信号２３Ａを加熱手段４への通電を行う加熱手段

通電手段２４に出力し、室内吸気とする通電信号２３Ｂを風路切替手段３への通電を行う風路切替手段通電手段２５に出力し、室内排気とする通電信号２３Ｃを風路切替手段７への通電を行う風路切替手段通電手段２６に出力し、風量変更信号２３Ｄを送風手段７への通電を行う送風手段風量変更手段２７に出力する。

【００１８】無給水除加湿器が室外空気より水分を吸着しているとき、室外吸気口より吸入された室外空気は吸着手段５で水分を吸着され送風手段によって室外排気口より排出されるが、このとき吸着反応は発熱反応であるため、図３に示すように室外空気の温度が低ければ吸着は促進され短い時間で必要な吸着量を得ることができ、室外空気の温度が低ければ吸着は遅くなり必要な吸着量を得るのに長い時間が必要になる。また、図４に示すように吸着剤への吸着率が上昇するに従い、吸着速度は減少してくる。そこで、室外空気の温度が低いときには通電信号２３Ａと通電信号２３Ｂと通電信号２３Ｃと風量切替信号２３Ｄを短い間隔で出力し、温度が高いときには通電信号２３Ａと通電信号２３Ｂと通電信号２３Ｃと風量切替信号２３Ｄを長い間隔で出力する。

【００１９】このように本実施例によれば吸着時における外気温度に対応した吸着時間が選定できるので、様々な外気温度下においても吸着剤の吸湿効率のよいところを利用することができ、従って吸湿手段の能力を効率よく利用することができる。

【００２０】次に、図５と図６により本発明の第２の実施例について説明する。ここで、先の実施例と同一の物については同一の符号を付して説明を省略する。

【００２１】図５において、３１は湿度検出手段である。また図６は第２の制御手段である。図６において４１は湿度検出手段３１で検出される吸入空気の湿度に対応した湿度信号４１Ａを出力する湿度信号出力手段、４２は判定手段で、湿度信号４１Ａを受けて湿度信号４１Ａに対応した時間間隔で通電信号４２Ａを、加熱手段４への通電を行う加熱手段通電手段２４に出力し、室内吸気とする通電信号４２Ｂを風路切替手段３への通電を行う風路切替手段通電手段２５に出力し、室内排気とする通電信号４２Ｃを風路切替手段７への通電を行う風路切替手段通電手段２６に出力し、風量変更信号４２Ｄを送風手段７への通電を行う送風手段風量変更手段２７に出力する。

【００２２】無給水除加湿器が室外空気より水分を吸着しているとき、室外吸気口より吸入された室外空気は吸着手段５で水分を吸着され送風手段によって室外排気口より排出されるが、このとき吸着は空気中の水蒸気の分圧に影響されるため、図７に示すように室外空気の湿度が低ければ吸着には時間がかかるので、必要な吸着量を得るのに長い時間が必要になり、室外空気の湿度が低ければ吸着は速くなり、短い時間で必要な吸着量を得ることができる。また、図４に示すように吸着剤への吸着率が上昇するに従い、吸着速度は減少してくる。そこで、室外空気の湿度が低いときには通電信号２３Ａと通電信号２３Ｂと通電信号２３Ｃと風量切替信号２３Ｄを長い間隔で出力し、湿度が高いときには通電信号２３Ａと通電信号２３Ｂと通電信号２３Ｃと風量切替信号２３Ｄを短い間隔で出力する。

【００２３】このように本実施例によれば吸着時における外気湿度に対応した吸着時間が選定できるので、様々な外気湿度下においても吸着剤の吸湿効率のよいところを利用することができ、従って吸湿手段の能力を効率よく利用することができる。

【００２４】次に、図８と図９により本発明の第３の実施例について説明する。ここで、先の実施例と同一の物については同一の符号を付して説明を省略する。

【００２５】また図９は第３の制御手段である。図９において５１は判定手段で、温度信号１０Ａと湿度信号４１Ａを受けて温度信号１０Ａと温度信号４１Ａに対応した時間間隔で通電信号５１Ａを、加熱手段４への通電を行う加熱手段通電手段２４に出力し、室内吸気とする通電信号５１Ｂを風路切替手段３への通電を行う風路切替手段通電手段２５に出力し、室内排気とする通電信号５１Ｃを風路切替手段７への通電を行う風路切替手段通電手段２６に出力し、風量変更信号５１Ｄを送風手段７への通電を行う送風手段風量変更手段２７に出力する。

【００２６】無給水除加湿器が室外空気より水分を吸着しているとき、室外吸気口より吸入された室外空気は吸着手段５で水分を吸着され送風手段によって室外排気口より排出されるが、このとき吸着反応は発熱反応でありまた空気中の水蒸気の分圧に影響されるため、図１０に示すように吸着量は室外空気の温度と湿度が互いに独立因子として影響するので、室外空気の温度が低く、湿度が高いときに吸着は促進され短い時間で必要な吸着量を得ることができ、室外空気の温度が低く湿度が低いときには吸着は遅くなり必要な吸着量を得るのに長い時間が必要になる。また、図４に示すように吸着剤への吸着率が上昇するに従い、吸着速度は減少してくる。そこで、室外空気の温度と湿度より得られる単位時間当たり最も吸着量の大きい時間間隔を通電信号２３Ａと通電信号２３Ｂと通電信号２３Ｃと風量切替信号２３Ｄに出力する。

【００２７】このように本実施例によれば吸着時における外気の温度と湿度に対応した吸着時間が選定できるので、様々な外気条件下においても吸着剤の吸湿効率のよいところを利用することができ、従って吸湿手段の能力を最大限に利用することができる。

【００２８】次に、図１１と図１２により本発明の第４の実施例について説明する。ここで、先の実施例と同一の物については同一の符号を付して説明を省略する。図１２は第４の制御手段である。図１２において６１は換気回数算出手段で、温度信号出力手段より出力される温

度信号２１Ａ湿度信号出力手段より出力される湿度信号４１Ａをうけて、換気回数信号６１Ａを出力する。６２は換気量算出手段で換気回数算出手段より出力される換気回数信号６１Ａをうけて規定の換気量との差をとり換気量信号６２Ａを出力する。６３は判定手段で、換気量信号６２Ａを受けて換気量信号６２Ａに対応した時間間隔で室外吸気とする通電信号６３Ａを風路切替手段３への通電を行う風路切替手段通電手段２５に出力し、室内排気とする通電信号６３Ｂを風路切替手段７への通電を行う風路切替手段通電手段２６にとなるように出力し、風量変更信号６３Ｃを送風手段７への通電を行う送風手段風量変更手段２７に出力する。

【００２９】このように本実施例によれば部屋の自然換気量を無視することなく換気量を決定することができるため、不必要な換気を行わなくてよいため室内の熱負荷を無駄に増やすことなく換気ができる。

【００３０】

【発明の効果】本発明は上記実施例の説明から明らかなように、室内の空気を取り込む室内吸気口と室外の空気を取り込む室外吸気口と前記室内吸気口と室外吸気口を切り替える第１の風路切替手段と、室外の空気または室内の空気を室内に排出する室内排気口と室外の空気または室内の空気を室外に排出する室外排気口と前記室内排気口と室外排気口を切り替える第２の風路切替手段と、送風手段と空気中の水分などの吸着作用を有する吸着手段より形成される通風回路と、前記吸着手段近傍に吸着手段を加熱する加熱手段と、前記送風手段の送風量変更を行う送風量変更手段と、前記加熱手段の通電を行う加熱手段通電手段と、前記の第１の風路切替手段に通電を行う第１の風路切替手段通電手段と、前記の第２の風路切替手段に通電を行う第２の風路切替手段通電手段をそなえた無給水除加湿器において、前記吸着手段より上流での吸入空気の温度を検出する温度検出手段を設けたことにより無給水除加湿器の吸湿時に、室外空気の温度を検出し、かかる条件下での単位時間当たり吸着量が最も大きくなる時間間隔で吸着を行わせることによって、吸着剤の能力を効率よく利用することができ、より多くの加湿量を得ることができる。

【００３１】また本発明は前記吸着手段より上流での吸入空気の湿度を検出する湿度検出手段を設けたことにより、無給水除加湿器の吸湿時に室外空気の湿度を検出し、かかる条件下での単位時間当たり吸着量が最も大きくなる時間間隔で吸着を行わせることによって、吸着剤の能力を効率よく利用することができ、より多くの加湿量を得ることができる。

【００３２】また本発明は前記吸着手段より上流での吸入空気の湿度を検出する湿度検出手段と湿度を検出する湿度検出手段を設けたことにより、無給水除加湿器の吸湿時に室外空気の温度と湿度を検出し、かかる条件下での単位時間当たり吸着量が最も大きくなる時間間隔で吸着を行わせることによって、吸着剤の能力を効率よく利用することができ、その吸着剤での最大の加湿量を得ることができる。

【００３３】上記については、吸湿時の吸入空気を室内空気にし、排出を室外排出口より行うことにより室内の除湿についても同様の効果を得ることができる。

【００３４】また本発明は、除加湿器の加湿量に対する室内の温度と湿度の変化から換気回数を算出し、さらに換気量を算出し、換気量に対応した換気を行うことで、室内の変換量が、変化しても無駄な換気を行わずにすみ、エネルギーの無駄を省くことができる。

【図面の簡単な説明】

【図１】本発明の第１の実施例における無給水除加湿器の構成図

【図２】本発明の第１の実施例における外気温度と各信号の出力時間間隔との関係の概念図

【図３】吸湿剤の温度による吸湿量の特性図

【図４】吸湿剤の吸着率による吸着速度の特性図

【図５】本発明の第２の実施例における無給水加湿器の構成図

【図６】本発明の第２の実施例における外気湿度と各信号の出力時間間隔との関係の概念図

【図７】吸湿剤の湿度による吸湿量の特性図

【図８】本発明の第３の実施例における無給水加湿器の構成図

【図９】本発明の第３の実施例における外気湿度と湿度にたいする各信号の出力時間間隔との関係の概念図

【図１０】吸湿剤の温度と湿度による吸湿量の特性図

【図１１】本発明の第４の実施例における無給水加湿器の構成図

【図１２】本発明の第４の実施例における室内湿度にたいする各信号の出力時間間隔との関係の概念図

【符号の説明】

１　室外吸気口
２　室内吸気口
３　風路切替手段
４　加熱手段
５　吸着手段
６　送風手段
７　風路切替手段
８　室内排出口
９　室外排出口
１０　温度検出手段
２１　温度信号出力手段
２３　判定手段
２３Ａ　通電信号
２３Ｂ　通電信号
２３Ｃ　通電信号
２３Ｄ　風量切替信号
２４　加熱手段通電手段

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２５　風路切替手段通電手段
２６　風路切替手段通電手段
２７　送風手段風量切替手段
３１　湿度検出手段
４１　湿度信号出力手段
４２　判定手段
４２Ａ　通電信号
４２Ｂ　通電信号
４２Ｃ　通電信号
４２Ｄ　風量切替信号
５１　判定手段
５１Ａ　通電信号

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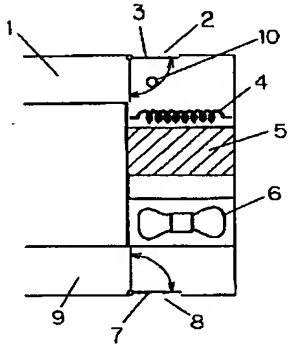
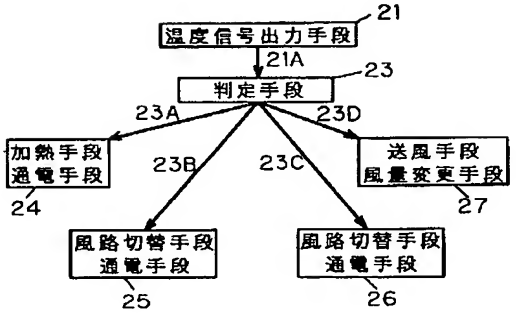
＊５１Ｂ　通電信号
５１Ｃ　通電信号
５１Ｄ　風量切替信号
６１　換気回数算出手段
６１Ａ　換気回数信号
６２　換気量算出手段
６２Ａ　換気量信号
６３　判定手段
６３Ａ　通電信号
６３Ｂ　通電信号
６３Ｃ　風量切替信号
＊

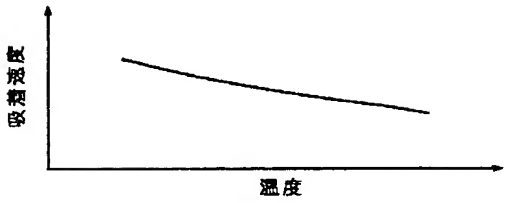
【図１】



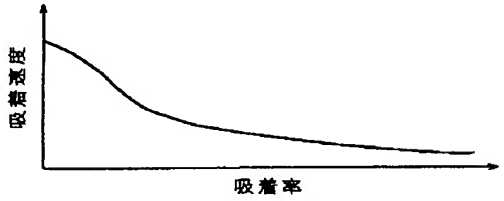
【図２】



【図３】



【図４】



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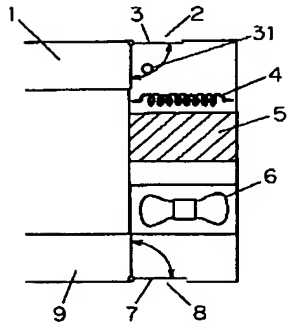

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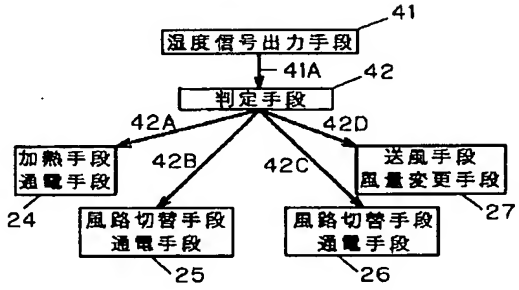

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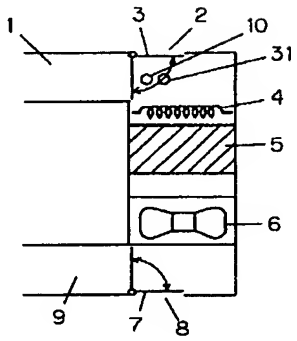
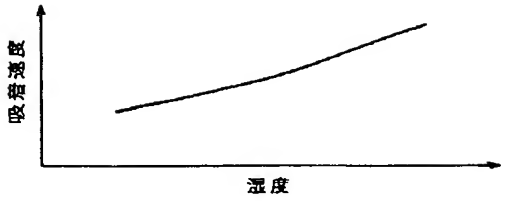
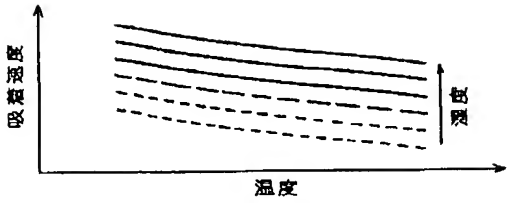


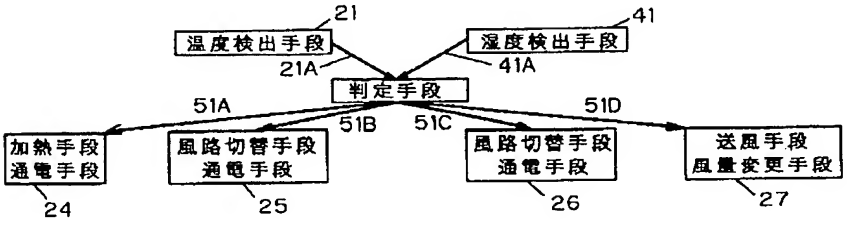
【図７】



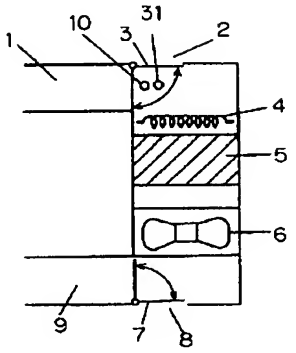
【図１０】



【図９】



【図１１】



【図１２】